

# BAH US - Decoding Cyber Security Stocks

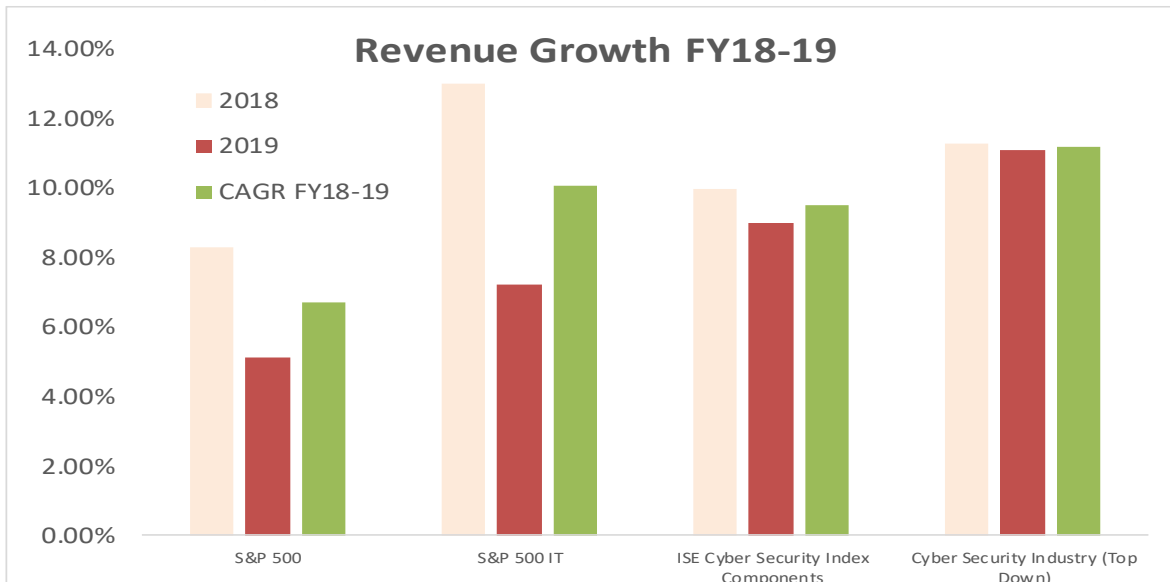
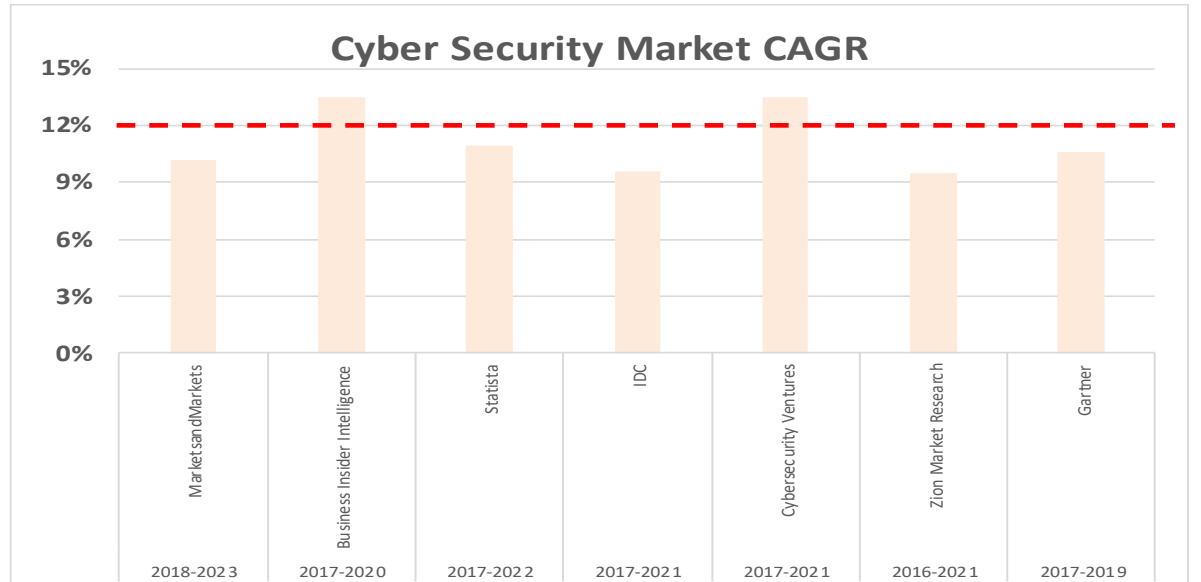
---

prepared by Carlos Salas Najera

November 2018

# Cyber Security – Market Forecasts and Hype Cycle Stage

- Cyber Security is expected to be one of the most fast-pacing industries globally from an organic and non-organic standpoint within the next 5-10 years.
- Independent research firms and consultancy companies forecast a 10.8% CAGR within the next five years with CAGR surpassing 11% for the FY18-20 period.
- This superior growth is sustained not by short-lived sources but sustainable drivers such as: a dynamic threat landscape, regulatory pressures (GDPR), technological architectural changes, tailwinds coming from a megatrends (new IoT economy, corporates transition to digital and increasing e-commerce platforms importance).
- Security breach-related costs are expected to keep on growing to surpass 6 trillion USD by 2021 compared to 3 trillion USD in 2015; which renders insufficient the current Global annual Cyber Security expenditure allocation (between 100 and 250 bn USD depending on whether or not IoT is included).



- On a relative basis Cyber Security displays as well a more dynamic sales growth compared to the overall S&P 500 market or the whole IT sector in 2019.
- The most interesting point is the mismatch for the Cyber Security industry between top down and bottom up estimates, which gives room for upgrades looking forward 2019 and 2020.
- Geographically speaking, North America will continue to be the largest market with around 45% market share, yet Asia Pacific is to experience the fastest CAGR within the next 5 years with CAGR~19%.
- Financial services holds the largest market share and is anticipated to maintain its dominance. Other high growth sectors will be A&D, Telecom and healthcare.

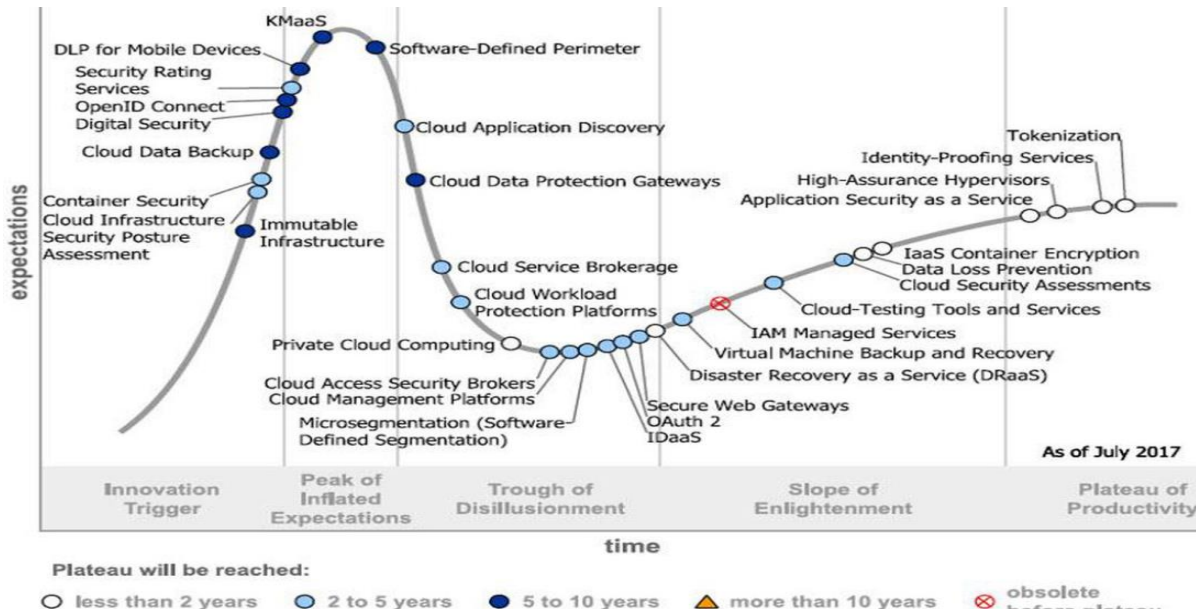
# Cyber Security – Segments and Hype Cycle Stage

- Cloud Security is the star segment with forecasts +50% CAGR and a low base within the next years as business digitalization, e-commerce platforms and IoT increase will boost the need for Cloud-centric security solutions.
- Gartner believes regulatory and privacy concerns will drive at least 10% of market demand for security services through 2019 impacting a variety of segments, such as identity and access management (IAM), and Data Security.
- Consumer Security Software as the tortoise in the race. This niche is infested of competitors and a fierce price competition to slash prices to lure subscribers. Worse yet, most of the big guns are present in this segment making it even more difficult for an average peer to outsmart them in terms of R&D budget.

Gartner Cyber Security Projections	2017 (mn \$)	2018	2019	CAGR
Application Security	2,434	12.7%	9.5%	11.1%
Cloud Security	185	64.3%	51.0%	57.5%
Data Security	2,563	19.5%	15.1%	17.3%
Identity Access Management	8,823	10.7%	8.3%	9.5%
Infrastructure Protection	12,583	12.1%	8.7%	10.4%
Integrated Risk Management	3,949	10.1%	8.4%	9.2%
Network Security	10,911	13.9%	7.2%	10.5%
Other Infor. Security Software	1,832	13.5%	9.9%	11.7%
Security Services	52,315	12.6%	9.0%	10.8%
Consumer Security Software	5,948	7.5%	4.2%	5.8%
<b>Total</b>	<b>101,544</b>	<b>12.4%</b>	<b>8.7%</b>	<b>10.6%</b>

Source: Gartner

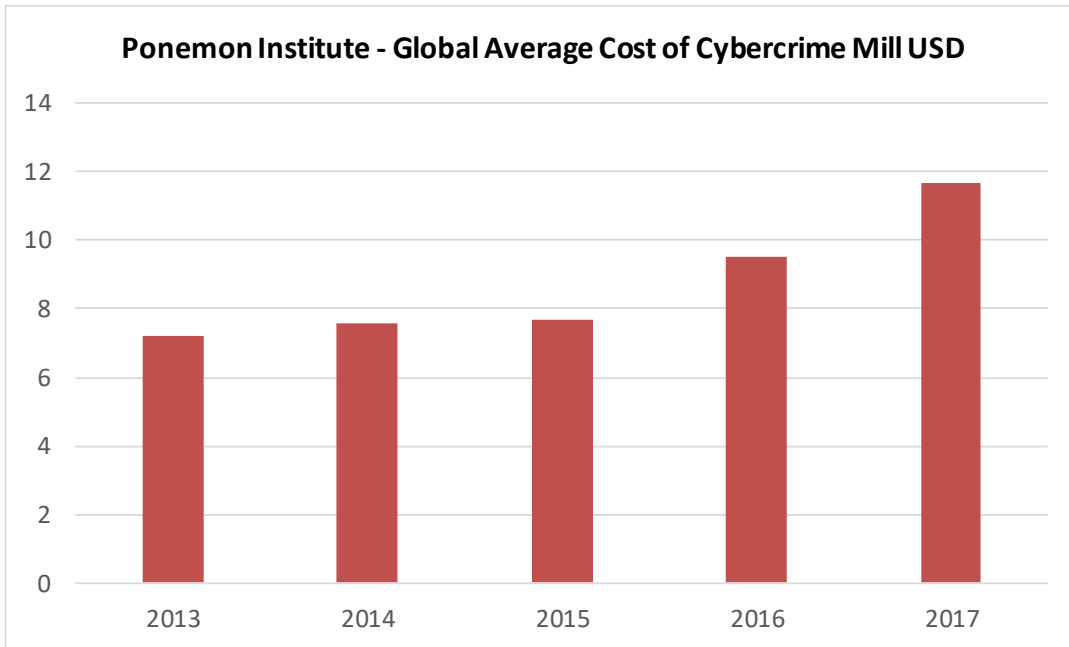
Gartner Hype Cycle - Cloud Security Trends 2017



- The delusional hype for Cloud Security trends is gone with most of the trends entering into “slope of enlightenment phase” tantamount to higher product feasibility, increasing client adoption and substantial monetization going forward.
- Licensing business model phasing out: following other software industries, Cyber Security firms have embraced SaaS model with more than 50% of the software delivery expected to be cloud-based by 2020. As a result, Cyber Security players will boost their cash flow stability and business quality score.
- Key within Cloud Security is encryption. Because so much information is now transmitted over wireless networks, encryption becomes more important and is expected to experience tremendous growth within the next 5 years.

# Cyber Security – Cybercrime and GDPR

- GDPR (General Data Protection Regulation) is a regulation in EU law on data protection and privacy for all individuals within the EU and EEA.
- In addition, corporates worldwide having even a small exposure to EU countries will be exposed to expensive GDPR fines should they decide to lag in terms of security spending and neglect a proper security framework.
- For instance, failure to report a breach to a regulator within 72 hours will trigger a Tier 1 fine (maximum between 10 mn EUR or 2% Global annual turnover).
- GDPR-Cyber Security connecting dots: Advanced Network Sandboxing, Identity and Access Management, Encryption, Vulnerability Management, Endpoint Security, Data Loss Prevention and Staff Cyber Security Awareness Training.



Source: Ponemon Institute

## GDPR Fines – Determined by Severity and Nature of the infringement



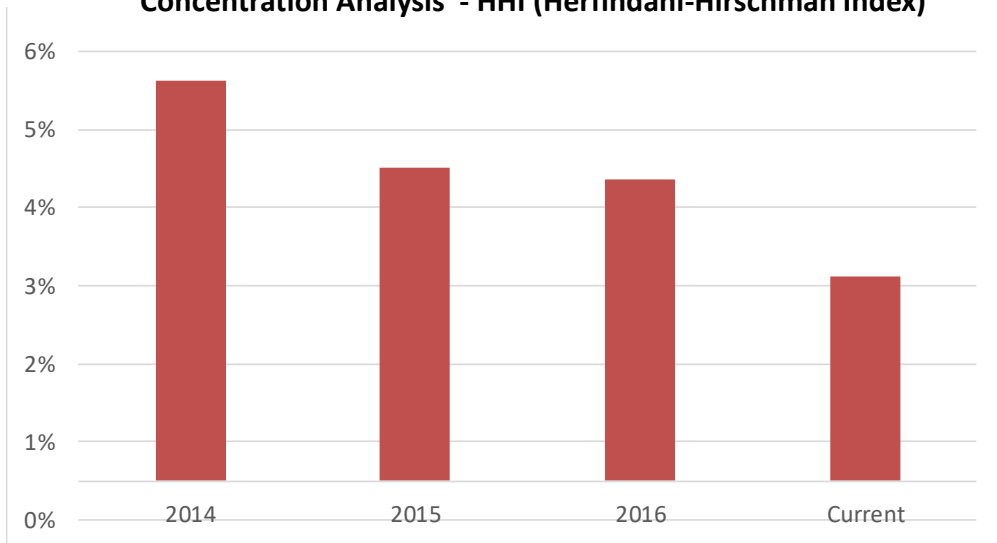
Source: GDPR

- Ponemon Institute reports a an average cost per Cybercrime of 11.7 mill USD growing +12.9% CAGR since 2013 with bleak projections going forward as IoT and Digitalization increase the vulnerability of the security architectures.
- Overall, Cybercrime costs are approximately 600bn USD per annum or 0.8% global GDP (source: CSIS) tantamount to 6 times the size of the Cyber Security industry.
- GDPR fines will exacerbate even further the impact of cybercrime costs. Worse yet, the impact on brand tarnishment from a security breach is very difficult to asses due to the intangible nature of the asset e.g. TSB and Equifax data breaches.
- A CTO survey as of June 2018 has yield an impressive result: 45% of the respondents expect to accelerate security spending, being this segment the highest priority ahead of SaaS (33%), Analytics (31%), Cloud (30%) or Storage (25%).

# Cyber Security – Market Competitive Structure

- 4-firm concentration ratio (6%) indicates perfect competition among industry incumbents compared to what competition panels considers “Oligopoly” (50-80%).
- HHI (Herfindahl-Hirschman Index) at 3% indicates perfect competition as well compared to what competition panels considers “Oligopoly” (+25%).
- The market share mix between public and private companies is 50/50 with Momentum Cyber, an advisory firm focused on cyber industry mergers and acquisitions, confirming it tracks 2,500 security companies.
- Despite a more fragmented market, T12M EPS and 3YR Average EPS growth for listed stocks has been positive with 13% YoY and 3% CAGR, respectively. New private startups seem to be not hurting listed players with some exceptions (e.g. Symantec) as listed-mid caps with niche expertise seem to be becoming winners.

**Concentration Analysis - HHI (Herfindahl-Hirschman Index)**



Source: Bloomberg data as of September 2018

## Cyber Security Industry – Competitive Analysis

Public Incumbents	84	Multiple Providers Median
Private Incumbents	2416	
Industry Size (Mn USD)	138,000	
Top 5 Mkt Share	12%	
Top 10	19%	
<b>Concentration Measure</b>	<b>Results</b>	<b>Conclusion</b>
<b>4CR</b>	<b>10%</b>	Perfect Competition to Moderate Oligopoly
<b>Herfindahl Index</b>	<b>0.03</b>	Perfect Competition
<b>4CR (4-firm Concentration Ratio)</b>	<b>Market</b>	
0	Perfect Competition	
0-50	Perfect Competition to Moderate Oligopoly	
50-80	Oligopoly	
80-100	Oligopoly to Moderate Monopoly	
100	Extremely Concentrated Oligopoly to Monopoly	
<b>Herfindahl Index</b>	<b>Market</b>	
<0.1	Perfect Competition	
0.1-0.25	Perfect Competition to Oligopoly	
>0.25	Oligopoly	
1	Oligopoly to Monopoly	

Source: Bloomberg data as of September 2018

- HHI (Herfindahl-Hirschman Index) has diminished to 3% from 5% in 2014. However, this is not a meaningful increase in competition as remember that HHI<10% indicates “perfect competition” so there has not been a meaningful change in competitiveness that really could shake the profitability of the industry.
- VC has been behind the surge of new Cyber Security startups with around 300 launches every year as low interest rates lure PE investors to high-growth areas.
- Data shows that dollars invested in Security Software companies approximately doubled yoy, with average deal sizes up about 40% YoY (source: CB Insights).
- Nonetheless, listed Cyber Security stocks have not experienced on average profitability issues and CTO surveys have shown they are more willing to consolidate current vendors (>50% vs <40% 2016) than test new alternatives.



# Cyber Security – Bottom-Up | Quantamental Scoring

Name	Cyber Security Niche	Market Cap (Mill USD)	VALUATION	GROWTH	PROFITABILITY	QUALITY	MOMENTUM	SCORE
CYBERARK SOFTWARE LTD/ISRAEL	Privileged Access Security	2,631	26%	64%	54%	41%	61%	45%
RAYTHEON COMPANY	Cyber Security Services	58,655	59%	40%	61%	55%	33%	52%
CISCO SYSTEMS INC	Threat Protection & Network Security	222,441	55%	33%	48%	44%	66%	49%
INTL BUSINESS MACHINES CORP	Enterprise IT Security Solutions	138,531	69%	26%	53%	48%	53%	52%
MICROSOFT CORP	Datacenter to Endpoint Protection	875,787	38%	69%	59%	50%	74%	54%
FIREYE INC	Advanced Threat Protection	3,280	24%	80%	38%	45%	47%	43%
LOCKHEED MARTIN CORP	Cybersecurity Solutions & Services	98,122	50%	45%	71%	62%	46%	55%
CHECK POINT SOFTWARE TECH	Unified Threat Management	18,550	35%	54%	69%	51%	41%	48%
SYMANTEC CORP	Endpoint, Cloud & Mobile Security	13,111	59%	53%	42%	39%	36%	47%
BAE SYSTEMS PLC	Cybersecurity Risk Management	26,274	67%	34%	44%	67%	35%	54%
BOOZ ALLEN HAMILTON HOLDINGS	Cybersecurity Solutions & Services	7,172	57%	50%	62%	57%	65%	58%
PALO ALTO NETWORKS INC	Threat Detection & Prevention	21,270	19%	80%	27%	60%	58%	45%
RAPID7 INC	Security Data & Analytics Solution	1,742	20%	60%	35%	41%	58%	39%
PROOFPOINT INC	Security-as-a-Service	5,456	20%	68%	43%	58%	14%	39%
SPLUNK INC	Big Data Security	17,309	13%	70%	55%	53%	55%	44%
SECUREWORKS CORP - A	Managed Security Services	1,149	48%	31%	36%	44%	81%	48%
INTEL CORP	McAfee/Hardware Enabled Security	212,060	64%	46%	57%	65%	29%	55%
CARBON BLACK INC	Endpoint & Server Security Platform	1,586	38%	47%	29%	31%	42%	37%
NORTHROP GRUMMAN CORP	Cyber & Homeland Security Services	54,697	51%	50%	45%	57%	45%	51%
FORTINET INC	Enterprise Security Solutions	15,122	18%	80%	68%	60%	84%	55%
MIMECAST LTD	Email Security	2,540	19%	53%	41%	44%	52%	39%
SOPHOS GROUP PLC	Anti-Virus & Malware Protection	3,145	37%	37%	47%	29%	34%	36%
BT GROUP PLC	Security & Risk Management Solutions	29,400	45%	18%	32%	66%	24%	41%
TREND MICRO INC	Server, Cloud, and Content Security	9,066	57%	57%	60%	61%	53%	58%
ACCENTURE PLC-CL A	Enterprise Security Strategy	110,951	50%	55%	70%	69%	47%	58%
TENABLE HOLDINGS INC	Vulnerability Scanning	3,529	30%	50%	49%	31%	64%	41%
BLACKBERRY LTD	Mobile & Data Security	5,582	30%	42%	36%	54%	36%	40%
AVAST PLC	Cyber Attack Protection	3,644	32%	24%	32%	45%	50%	37%
AT&T INC	Managed Security & Consulting	245,419	79%	51%	46%	49%	42%	57%
DELL TECHNOLOGIES INC-CL V	Holistic Cyber Solutions	19,319	31%	41%	62%	19%	56%	38%
IMPERVA INC	Data & Applications Security	1,639	38%	68%	40%	57%	40%	48%
DXC TECHNOLOGY CO	Cybersecurity Services & Solutions	26,533	78%	16%	50%	40%	63%	53%
ALPHABET INC-CL C	Project Shield for News Sites	822,512	27%	65%	54%	51%	39%	44%
L3 TECHNOLOGIES INC	National Security Solutions	16,584	61%	29%	40%	49%	50%	48%
ORACLE CORP	Identity Security Operations Center	196,330	54%	40%	53%	49%	68%	53%
SCIENCE APPLICATIONS INTE	Cybersecurity Professional Services	3,465	68%	45%	63%	58%	39%	57%
SIEMENS AG-REG	Cybersecurity for Federal Government	111,203	71%	37%	41%	52%	40%	52%
AKAMAI TECHNOLOGIES INC	Secure Cloud & Mobile Computing	12,376	35%	39%	39%	46%	30%	38%
QUALYS INC	Cloud Security & Compliance	3,482	24%	71%	49%	59%	57%	48%
VERIZON COMMUNICATIONS INC	Network & Data Security	220,357	70%	49%	48%	42%	53%	54%
F-SECURE OYJ	Internet Security for All Devices	584	50%	33%	57%	58%	32%	48%
VMWARE INC-CLASS A	Mobile, Data Center & Cloud Security	64,445	32%	32%	56%	51%	61%	45%
JUNIPER NETWORKS INC	Threat Intelligence & Network Security	10,242	71%	29%	36%	39%	55%	49%
RADWARE LTD	Application Security & Delivery	1,172	35%	57%	54%	54%	34%	46%
A10 NETWORKS INC	DDoS & Cloud Protection	439	51%	59%	45%	40%	19%	44%
LEIDOS HOLDINGS INC	Cyber Defense Solutions	10,391	75%	42%	45%	43%	42%	53%
HP INC	Enterprise Blockchain Solutions	41,206	81%	38%	62%	67%	49%	63%
FORESCOUT TECHNOLOGIES INC	Network Security & Access Control	1,671	35%	40%	48%	42%	66%	44%
CYREN LTD	Web, Email & Mobile Security	163	39%	34%	21%	58%	57%	43%
F5 NETWORKS INC	Cloud & Data Center Security	11,888	38%	63%	70%	63%	63%	56%
ZSCALER INC	Security-as-a-Service Solutions	5,032	18%	42%	47%	55%	56%	41%
CACI INTERNATIONAL INC-CL A	Intelligence, Defense & Federal Security	4,585	63%	51%	65%	47%	67%	58%
NXT-ID INC	Biometrics	34	52%	46%	29%	40%	9%	38%
GLOBALSCAPE INC	Secure File Transfer	85	71%	30%	41%	49%	32%	49%
ONESPAN INC	Authentication & e-Signature Solutions	778	38%	55%	54%	42%	76%	50%
VERISIGN INC	Internet Security Solutions	19,552	32%	51%	82%	49%	77%	53%
AHNLAB INC	Internet Security Solutions	480	77%	68%	66%	50%	25%	60%
ZIX CORP	Email Encryption & Data Protection	298	47%	50%	53%	33%	50%	45%
NCC GROUP PLC	Information Assurance Services	762	67%	42%	55%	65%	37%	56%
NETSCOUT SYSTEMS INC	Situational Awareness & Incident Response	2,029	60%	41%	38%	39%	30%	44%
OKTA INC	Enterprise Identity Management	7,612	13%	48%	39%	63%	72%	44%
INFOBLOX INC	Automated Network Control & Security	6	36%	62%	59%	58%	15%	46%
PRECISE BIOMETRICS AB	Biometrics	67	35%	48%	23%	51%	26%	38%
SAILPOINT TECHNOLOGIES HOLDI	Identity & Access Management	3,039	25%	29%	33%	53%	76%	41%
VARONIS SYSTEMS INC	Data Security & Analytics	2,149	24%	69%	58%	36%	52%	43%
INSIDE SECURE SA	Smartphone & Mobile Device Security	138	68%	62%	59%	54%	39%	58%
SSH COMMUNICATIONS SECURITY	Privileged Access Control, Encryption	86	30%	56%	79%	61%	33%	49%
FINGERPRINT CARDS AB-B	Biometrics	371	53%	40%	12%	55%	41%	44%
FINJAN HOLDINGS INC	Cybersecurity IP Licensing	119	76%	52%	81%	76%	63%	71%
VERINT SYSTEMS INC	Security Intelligence, Surveillance & Fraud Detection	3,218	52%	60%	53%	51%	65%	55%
MOBILEIRON INC	Enterprise Mobility Management	542	39%	73%	43%	41%	39%	45%
COMMVAULT SYSTEMS INC	data backup and recovery	3,179	29%	42%	54%	57%	60%	46%
CARBONITE INC	Online Backup Service	1,266	30%	53%	47%	38%	55%	42%
MANTECH INTERNATIONAL CORP-A	Cyber Security Services	2,517	70%	49%	56%	63%	48%	60%
EVERBRIDGE INC	SaaS-based communications provider	1,720	20%	41%	30%	63%	58%	41%
ULTRA ELECTRONICS HLDGS PLC	Aerospace & Defence	1,540	77%	31%	43%	68%	49%	59%
DIGITAL ARTS INC	Email Anti-Spam Solutions	692	33%	42%	54%	57%	48%	46%
FFRI INC	Endpoint Security Software	242	21%	26%	67%	50%	42%	39%

- The Bottom-up Quantamental Scoring uses a wide array of fundamental, market and technical indicators tailored to assess a Cyber Security business. Both profitable backtested indicators and fundamental metrics related to the key drivers of a Cyber Security business (e.g. R&D-to-Sales) are considered.
- An overall weighted-score is calculated from measuring each company's Valuation(30% weight), Growth (15%), Profitability (15%), Quality (25%) and Momentum (15%) profile score with multiple variables used to attain a comprehensive output:
- **Valuation:** Price-to-Sales, Price-to-Book, Dividend Yield, FCF Yield, EV/T12M EBITDA and popularity (number of analysts covering the stock).
- **Growth:** Revenue growth, 5YR Revenue Growth, R&D-to-Sales, T12M EPS growth and 3YR Average EPS Growth.
- **Profitability:** Gross Margin, Gross Margin YoY, Operating Margin, ROIC, Asset Turnover, Asset Turnover Change.
- **Quality:** Altman's Z-Score, Total Debt-to-EBITDA, Operating Leverage, Operating Margin Volatility, Interest Cover, WACC Optimization, Sales/EPS/CFO Persistence, EVA Spread, EVA Change.
- **Momentum:** 5 Days-to-20 Days MA Trading Volume, 6-month Price Momentum, Price-to-200d MA, 14-day RSI, 1-month Earnings Momentum.





# Booz Allen Hamilton (BAH US)

Booz Allen Hamilton Holding (BAH) is a provider of management consulting services and technology services to the U.S. government, such as cloud computing and cyber security consulting, and engineering consulting. In addition to the U.S. government, BAH provides its management and technology consulting services to large corporations, institutions, and non-profit organisations with operations around the globe.

BAH was the only candidate shortlisted in all the 3 screens showing above average scores for all the dimensions considered: Valuation, Growth, Profitability, Quality and Momentum.

## Investment Rationale – BUY - Upside Average +24% or 62.97 USD 12-month Target Price with +16%-32% total return scenarios

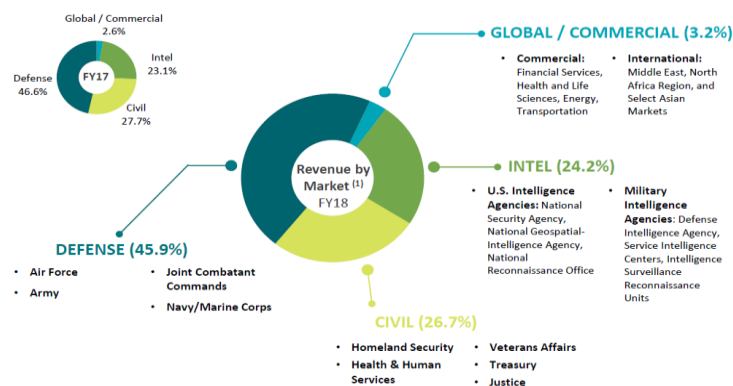
- Moat:** BAH displays a significant score from our competitive analysis on the back of its nature as Defence Contractor, long track record serving the US Government, healthy backlog and industry experts opinion.
- High Barriers of Entry:** Defence contractors inherently have long term relationships with Governments that build trust in the long term.
- Multiple megatrends exposure:** Cyber Security IT expenditure has been lagging penetration of new technologic trends such as IoT, EV/AV, Cloud computing and corporate digitalization. Things are getting even worse.
- Vision 2020:** BAH showing good track record towards attaining its Vision 2020 plan with earnings expected to grow double-digit by 2020.
- Significant quality improvement:** recent developments (gaining new contracts) and megatrends kicking in the next years are helping BAH to improve its business quality e.g. EVA (Economic Value Added) boost.
- New Growth opportunities:** BAH is also starting to become more aggressive with large corporate clients with recent BAH's deals tapping into high-growth Cyber technologies (Cloud Security) and new geographic areas.
- Shareholder-friendly policy:** sustainable dividends are not usual standard in the Cyber Security universe, yet BAH has displayed significant commitment sharing dividend and carrying out buyback programs.
- M&A target:** BAH's size (7bn USD), public float (97.5% Mkt Cap) and cheaper valuation than peers despite its positioning in high-growth areas over the last years makes it a good target within the Cyber Security space.
- Consensus falling behind:** BAH management is delivering in line with Vision 2020 guidance but Consensus not pricing medium-to-long term targets:
- Valuation:** BAH PTS, PER and EV/EBITDA are below Cyber stocks average. Narrowing it to close peers within the Defence space (e.g. Mantech International) yields an upside +19%-35% (Average +27% or 62.97 USD).
- Momentum:** BAH's recent contract success (1bn 6-year contract with 6 US agencies), GDPR boosting low base corporate business and November's US Midterm elections to boost sentiment for Cyber Security stocks.

## Risks

- Cyber Security sell-off: BAH is sensitive in sentiment changes for the Cyber Security Theme and increasing active and passive funds (e.g. PureFunds ISE Cyber Security ETF) activity despite BAH's reduced weight in the index (1% Weight).
- Competitive risks: stricter or worse than expected Cyber Security Budgets for the next 5 years will dampen BAH story. Although the probability of this risk is low bearing in mind how hack attacks and malicious data usage are expected to increase.
- Hacking and Leak risk: 2013's Edward Snowden (BAH employee at the time) caused brand tarnishment but no commercial damage as BAH has recovered significantly since then.
- Corporate ventures disappointing: BAH experience competing in the corporate arena and poses a risk of slashing rates to penetrate demand, yet the bright side is that the percentage of this niche is still too small to hurt overall profitability.
- FCF generation weakness lingers: BAH FCF generation has been its soft spot as the proportion of funded contracts has diminished below historical averages (16% vs 22% Historical average).
- Style risks: BAH and Cyber Security stocks overall display a significant bias towards Growth and Small Cap style so any rallies in Value or Large Cap stocks could be a downside risk.

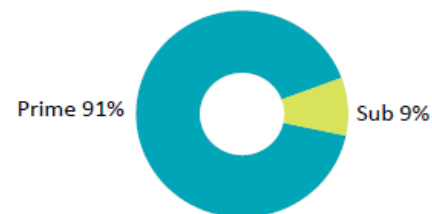
FINANCIAL RATIOS ANALYSIS	PERCENTILE T12M vs H			
	T12M	10YR AVG	5YR AVG	3YR AVG
<b>Growth</b>				
T12M Sales	7.1%	67%	80%	67%
T12M Operating Income	12.4%	78%	100%	100%
T12M EBITDA	14.6%	78%	100%	100%
Basic EPS	33.5%	86%	100%	100%
Diluted EPS	32.5%	86%	100%	100%
CFO	-8.4%	33%	40%	33%
FCF	-13.7%	33%	40%	33%
<b>Dupont</b>				
Return on Com Eqty	54.4%	67%	40%	67%
Normalized ROE	54.4%	67%	40%	67%
Return on assets	9.1%	89%	80%	67%
Trailing 12M Operating Margin	8.6%	89%	80%	100%
Asset Turnover	1.74	11%	0%	0%
Financial Leverage	6.0	44%	0%	0%
<b>Profitability</b>				
Trailing 12M Gross Margin	53.3%	78%	60%	33%
Trailing 12M Operating Margin	8.6%	89%	80%	100%
EBIT Margin	7.2%	89%	80%	100%
Trailing 12M Profit Margin	5.2%	89%	80%	67%
<b>Efficiency</b>				
T12 A/R turn-days	73	100%	100%	100%
T12 Inv turn-days				
Accounts Payable Turnover Days	39	100%	100%	100%
Cash Cycle	73	100%	100%	100%
Cash Conversion Cycle	33	100%	100%	100%
A/R turnover	5.0	0%	0%	0%
Inv. turnover				
Accounts Payable Turnover	9.2	0%	0%	0%
<b>Liquidity</b>				
Working Capital to Sales	7.7%	56%	100%	100%
Current Ratio	1.5	67%	100%	100%
Quick ratio	1.4	56%	100%	100%
Cash ratio	14.7%	0%	0%	0%
Cash & ST Investments to Trailing 12M Sales	2.4%	0%	0%	0%
EBIT/total interest exp	6.2	33%	20%	0%
Dvd coverage	2.8	71%	80%	67%
<b>Solvency</b>				
Net debt	1654	100%	100%	100%
Tot Debt / Total Assets	0.50	33%	20%	33%
LT Debt / Tot Assets	0.48	33%	20%	33%
LT Debt / Total Equity	2.9	33%	20%	33%
Net Debt / Tot Equity	2.7	44%	20%	33%
Total Debt / T12M EBITDA	2.98	22%	0%	0%
FCF / Total Debt	0.14	11%	20%	33%
Net Debt-to-EBITDA	2.7	78%	80%	67%
<b>Quality</b>				
Book-to-Bill Ratio	1.48	80%	80%	67%
WACC	9.2	67%	80%	67%
ROIC	16.8	89%	80%	67%
EVA Spread	7.6	89%	80%	67%
CFO-to-Sales	5.3%	33%	20%	33%
CFO-to-Net Income	1.0	11%	20%	33%
T12M CFO-to-Net Income	1.0	11%	20%	33%
T12M FCF / EBITDA	0.41	11%	20%	33%
T12M FCF / Sales	4.0%	22%	20%	33%
Capital Expenditure to Depreciation Expense	1.3	100%	100%	100%
Goodwill to Assets %	44%	56%	20%	0%
Goodwill+Intang to Assets %	51%	67%	40%	33%
Accruals / Tot Assets	-0.2%	89%	80%	67%
Cumulative Accruals / Tot Assets %	-36.	3%	6%	13%
Accounts Receivable Growth To Sales Growth	2.6	100%	100%	100%
<b>Inventory Growth To Sales Growth</b>				
T12M Eff Tax Rate	27.4%	11%	20%	33%
Altman's Z-Score	2.81	89%	100%	100%

## Client Segmentation

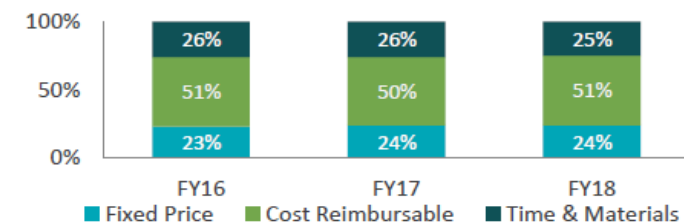


## Contract Mix

### PRIME/SUB

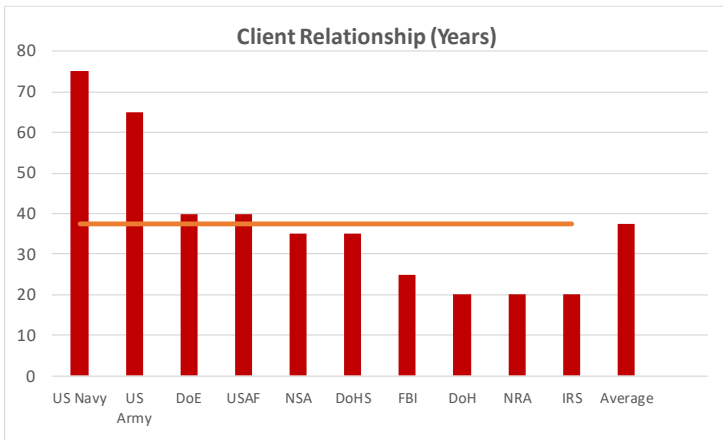


### CONTRACT MIX

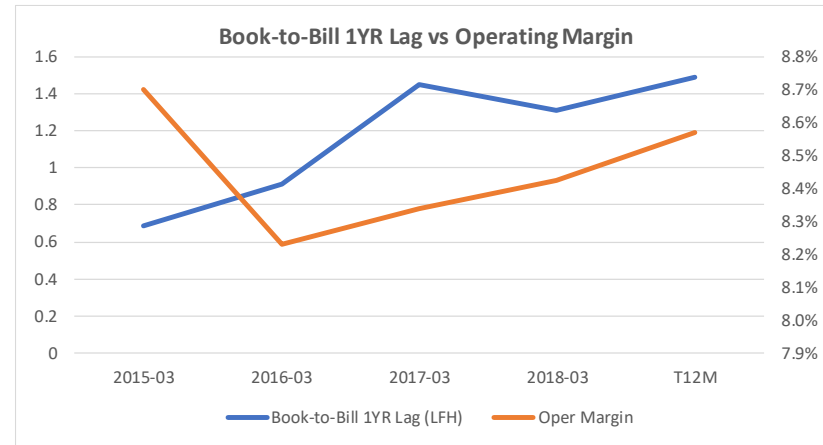




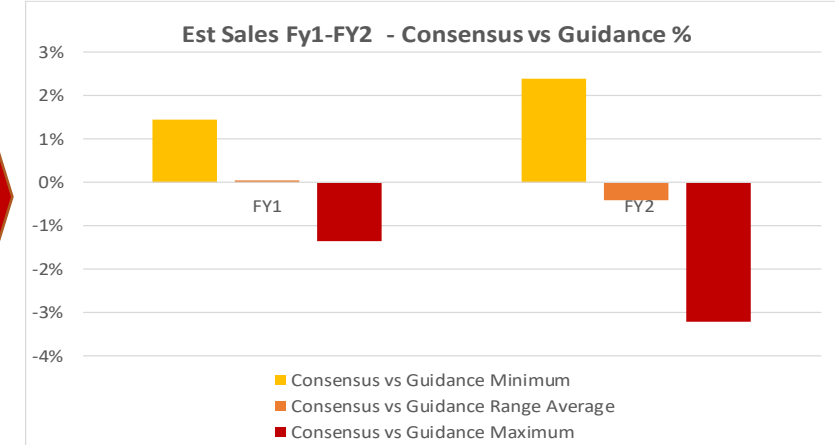
## High Barriers of entry Cyber Security niche...



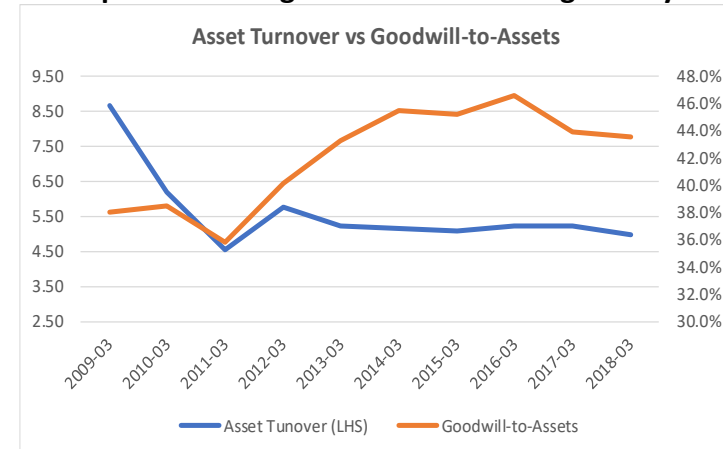
## ... allowing BAH to grow backlog profitably...



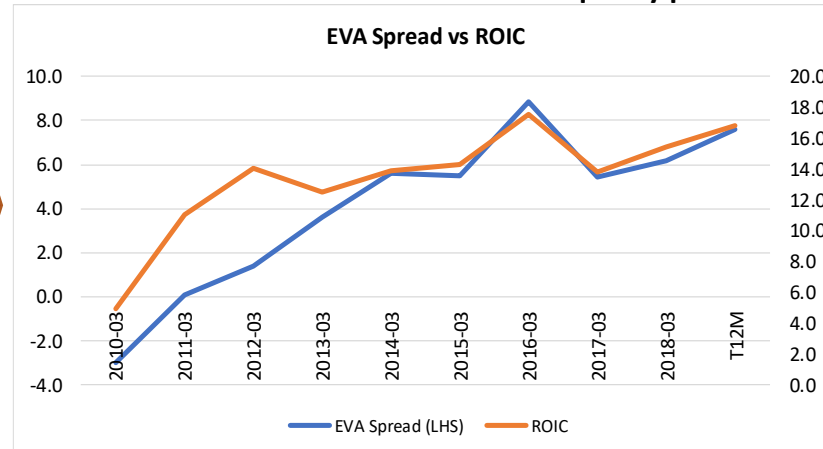
## ... while consensus not pricing yet all the story



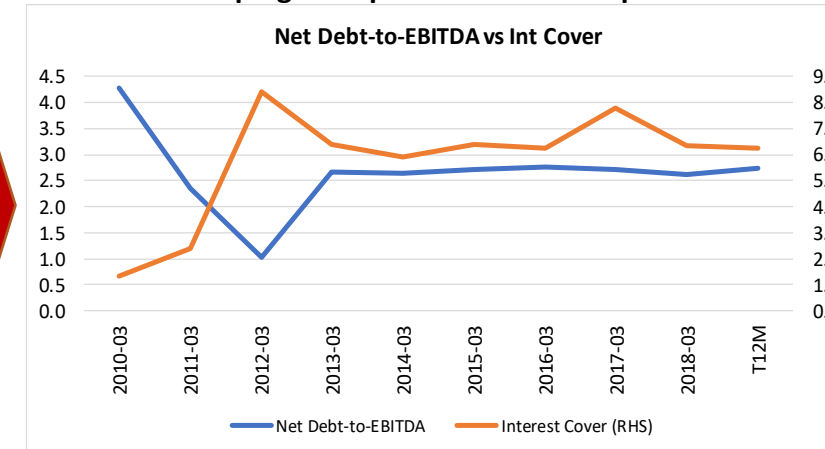
## Despite increasing M&A deals to strengthen Cyber...



## ... BAH ROIC and EVA have boosted quality profile ...

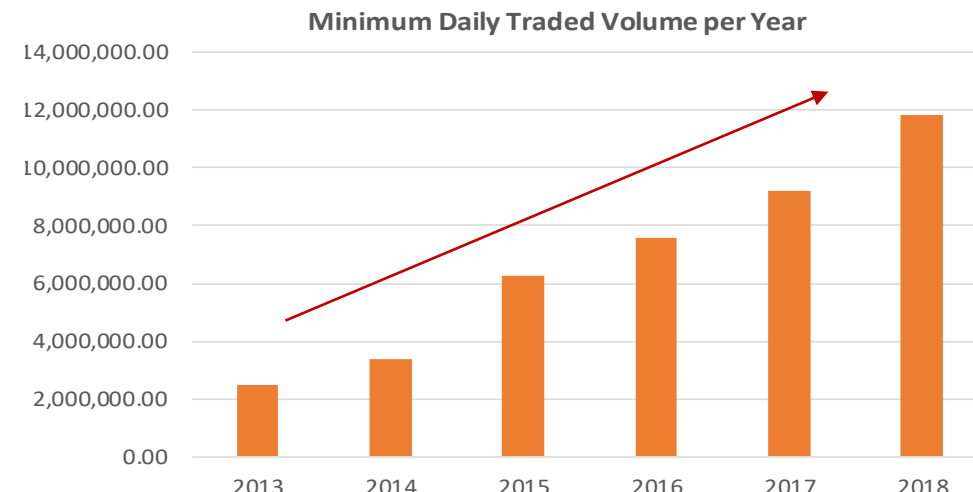


## ... helping to improve BAH's credit profile



## Trading Volume USD and Trading Algo Scenarios

	Trading Vol USD			TRADING ALGO assuming Average Vol USD Scenario		
	Maximum	Average	Minimum	5% Volume	10% Volume	15% Volume
2013	82,538,576.15	8,275,814	2,476,160.96	413,791	827,581	1,241,372
2014	110,220,563.96	15,044,129	3,384,783.93	752,206	1,504,413	2,256,619
2015	189,245,068.07	24,554,476	6,259,633.49	1,227,724	2,455,448	3,683,171
2016	278,435,353.86	30,827,141	7,563,186.49	1,541,357	3,082,714	4,624,071
2017	439,067,186.61	38,484,322	9,207,749.93	1,924,216	3,848,432	5,772,648
2018	134,764,467.84	39,648,550	11,847,635.11	1,982,428	3,964,855	5,947,283
<b>2013-2018</b>	<b>439,067,187</b>	<b>28,134,873</b>	<b>2,476,160.96</b>	<b>1,406,744</b>	<b>2,813,487</b>	<b>4,220,231</b>
<b>2015-2018</b>	<b>439,067,187</b>	<b>36,320,004</b>	<b>7,563,186.49</b>	<b>1,816,000</b>	<b>3,632,000</b>	<b>5,448,001</b>



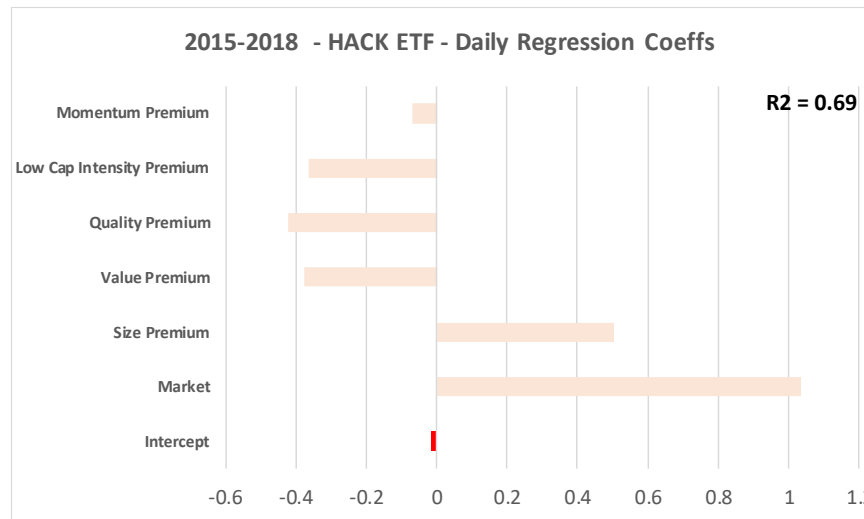
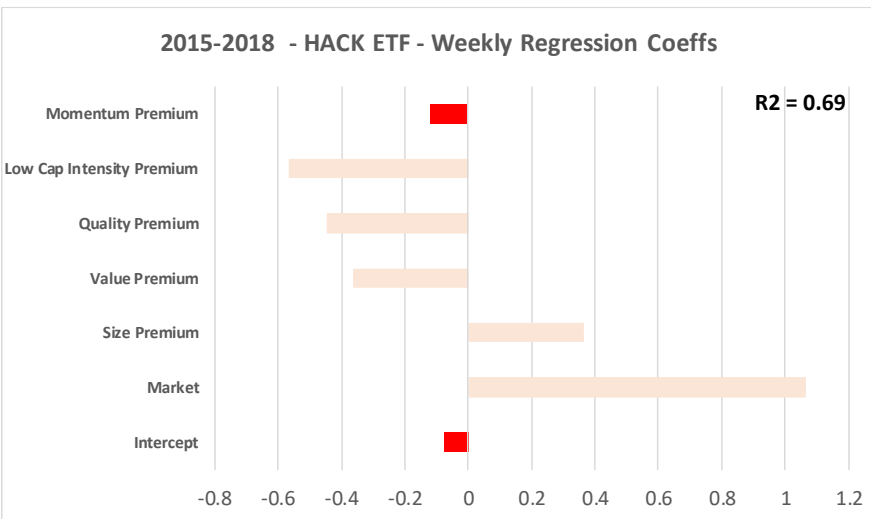
## Liquidity Simulation - Average Trading Vol USD Scenario

	% AuM Daily Liquidity for a 1000 mn USD AuM			Days to exit a position assuming 1% AuM allocation		
	5% Volume	10% Volume	15% Volume	5% Volume	10% Volume	15% Volume
2013	0.04%	0.08%	0.12%	24.2	12.1	8.1
2014	0.08%	0.15%	0.23%	13.3	6.6	4.4
2015	0.12%	0.25%	0.37%	8.1	4.1	2.7
2016	0.15%	0.31%	0.46%	6.5	3.2	2.2
2017	0.19%	0.38%	0.58%	5.2	2.6	1.7
2018	0.20%	0.40%	0.59%	5.0	2.5	1.7
<b>2013-2018</b>	<b>0.14%</b>	<b>0.28%</b>	<b>0.42%</b>	<b>7.1</b>	<b>3.6</b>	<b>2.4</b>
<b>2015-2018</b>	<b>0.18%</b>	<b>0.36%</b>	<b>0.54%</b>	<b>5.5</b>	<b>2.8</b>	<b>1.8</b>



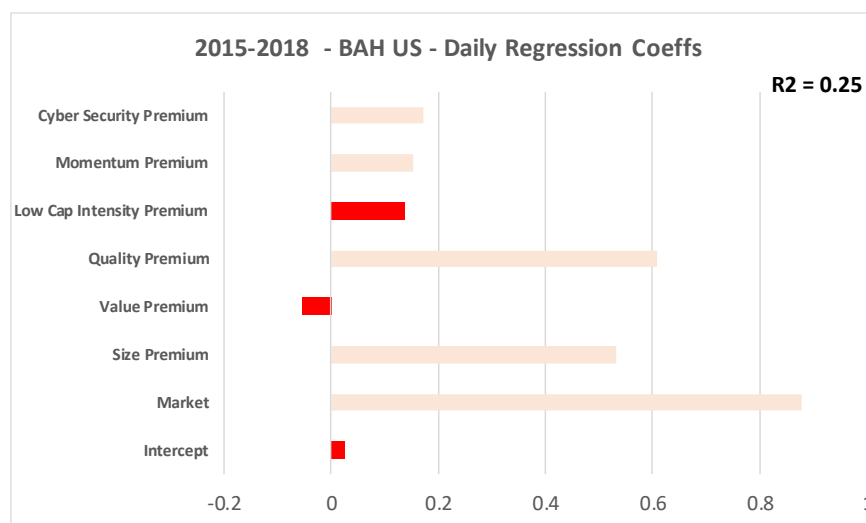
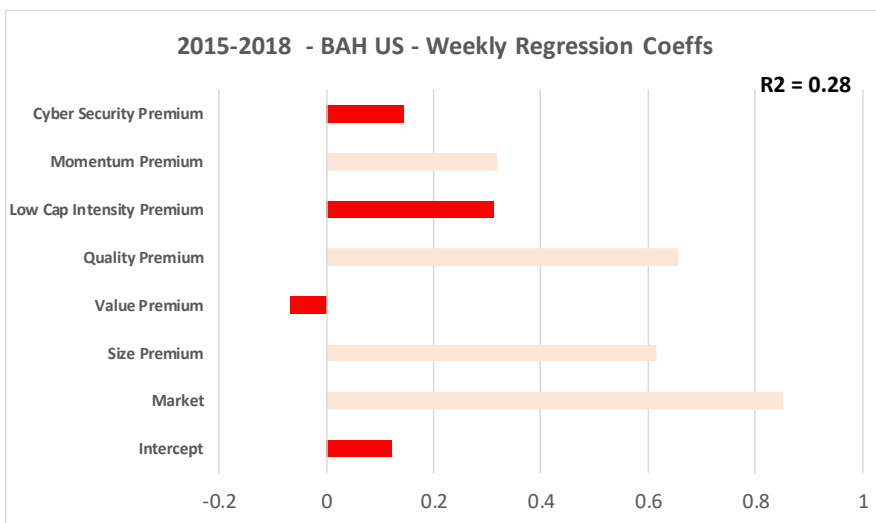
- BAH liquidity has increased remarkably since IPO (2010) over the last 3 years with daily trading volume averaging 36 mill USD for 2015-18.
- Assuming a trading algo executing orders only for 5% of daily volumes, using an 2015-20178 average trading volume USD scenario, still provides a hefty 1.8 mill USD liquidity for 2015-18.
- A 1,000 bn USD mandate willing to allocate to BAH could allocate 1% of the portfolio and exit the trade in 1.8 days using a 15% volume algo and using a average trading Volume USD scenario.
- Worst Case scenario (not shown in the table): it will take 8.8 days to exit a 1% position if a minimum trading volume USD for the period 2015-218 occurred.

## Cyber Security ETF (HACK US) - STYLE ANALYSIS



- Cyber Security ETF has displayed significant positive sensitivity to small cap and market premium.
- On the other hand, the Cyber Security index is clearly exposed to Bad quality, Growth and High Capital Intensity premiums/styles.
- Momentum premium seems to be significant but not very high no matter if we measure it via daily or weekly returns.
- A PM should go long the Cyber Index or a tracker basket assuming he wants to be exposed to a High Growth Small Cap Bad Quality bias strategy with high market beta.

## Booz Hallen Hamilton (BAH US) - STYLE ANALYSIS



- BAH is largely positively exposed to Quality, Size and Market Premiums as well as to Momentum and Cyber Security Index.
- The company maintains the Growth bias of the Cyber Security industry, yet this sensitivity is not as pronounced.
- BAH offers a higher sensitivity to factors where the Cyber Security index is negatively exposed i.e. Quality and Momentum.
- Bear in mind that BAH's regression's R2 is very low (0.25), yet this analysis is helpful to have an style sensitivity approximation.
- A PM willing to play Cyber Security with some quality bias, momentum sensitivity while keeping the a low market beta small cap growth bias should go long BAH.